इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 1743 (1973): Mutton and Goat Meat Canned in Brine [FAD 18: Slaughter House and Meat Industry]

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 1743 - 1973
(Reaffirmed 2000)

Indian Standard

SPECIFICATION FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(*First Revision*)

First Reprint SEPTEMBER 1990

UDC 637·517·3 : 664·93

© *Copyright* 1974

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 7 *April* 1974

Indian Standard

SPECIFICATION FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(First Revision)

Meat and Meat Products Sectional Committee, AFDC 18

Chairman	*Representing*
Dr C. M. Singh	Indian Veterinary Research Institute (ICAR), Izatnagar
Members	
Dr B. Panda (*Alternate* to Dr C. M. Singh)	
Dr V. S. Asthana	Central Dairy Farm, Aligarh
Shri K. S. Bist (*Alternate*)	
Dr S. K. Barat	Central Leather Research Institute (CSIR), Madras
Dr S. Divakaran (*Alternate*)	
Brig Brij Chandra	Directorate of Remounts Veterinary Services, Army Headquarters
Maj H. S. Dhinsa (*Alternate*)	
Chairman, Technical Standardization Committee (Foodstuffs)	Ministry of Agriculture (Department of Food)
Secretary, TSC (F) (*Alternate*)	
Shri D. S. Chadha	Central Committee for Food Standards (Ministry of Health & Family Planning)
Dr A. K. Chatterjee	Ministry of Agriculture, Department of Agriculture
Shri K. C. De'	Metal Box Co of India Limited, Calcutta
Dr S. C. Chakravorty (*Alternate*)	
Shri Anand K. Goyle	Essex Farms Private Limited, New Delhi
Shri Arun K. Goyle (*Alternate*)	
Shri R. N. Gupta	Continental Exports, New Delhi
Shri Sudhir Gupta (*Alternate*)	
Health Officer	Corporation of Madras
Veterinary Officer (*Alternate*)	
Dr D. M. Khare	Government Bacon Factory, Bombay

(*Continued on page* 2)

© *Copyright* 1974

BUREAU OF INDIAN STANDARDS

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(*Continued from page* 1)

Members	*Representing*
DR S. S. KRISHNA MURTHY	Regional Bacon Factory, Gannavaram
SHRI D. B. P. CHANDRASEKHARA RAO (*Alternate*)	
DR N. L. LAHIRY	Central Food Technological Research Institute (CSIR), Mysore
DR M. N. MOORJANI (*Alternate*)	
SHRI B. C. MALHOTRA	State Trading Corporation of India Limited, New Delhi
SHRI R. K. TANEJA (*Alternate*)	
MUNICIPAL HEALTH OFFICER	Municipal Corporation of Delhi
ZONAL HEALTH OFFICER (HQ) (*Alternate*)	
SHRI V. NAGARAJU	Central Mechanical Engineering Research Institute (CSIR), Durgapur
SHRI S. RAMASWAMY	Accelerated Freeze Drying Factory (Ministry of Defence), Tundla
SHRI T. N. RAWAL (*Alternate*)	
SHRI S. RAMASWAMY	Directorate General of Technical Development, New Delhi
DR M. RANGANATHAN	Madras Veterinary College, Madras
DR R. RAMAMURTHI (*Alternate*)	
SHRI N. K. MURALIDHARA RAO	Directorate of Marketing and Inspection (Ministry of Agriculture), Faridabad
SHRI S. JAYARAMAN (*Alternate*)	
COL M. C. SANYAL	Quartermaster General's Branch, Army Headquarters
LT-COL O. P. KAPUR (*Alternate*)	
DR T. R. SHARMA	Defence Food Research Laboratory, Mysore
SHRI S. B. KADKOL (*Alternate*)	
DR HARI BHAGWAN, Director (Agri & Food)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI MANOHAR T. SANTWANI
Assistant Director (Agri & Food), ISI

Meat and Meat Products Subcommittee, AFDC 18 : 3

Convener	
DR M. N. MOORJANI	Central Food Technological Research Institute (CSIR), Mysore
Members	
DR B. R. BALIGA (*Alternate* to DR M. N. Moorjani)	
DR A. G. AJWANI	Municipal Corporation of Delhi
DR V. S. ASTHANA	Central Dairy Farm, Aligarh
BRIG BRIJ CHANDRA	Directorate of Remount Veterinary Services, Army Headquarters
MAJ H. S. DHINSA (*Alternate*)	

(*Continued on page* 32)

Indian Standard

SPECIFICATION FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 1 November 1973, after the draft finalized by the Meat and Meat Products Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Mutton and goat meat is canned in brine with or without the addition of sodium nitrate, sodium nitrite and sugar. In order to ensure the quality and wholesomeness of the finished product, various physical, chemical, microbiological and hygienic requirements have been prescribed in this standard.

0.3 This standard was first published in 1960. This revision incorporates a number of important modifications, namely, (a) requirement and method of determining headspace have been deleted; (b) maximum limit for combined preservatives like nitrate and nitrite has been fixed; (c) maximum limit for copper has been lowered, while the limits for zinc and tin have been relaxed; and (d) reference to latest Indian Standard methods of test based on ISO recommendations has been provided.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for mutton and goat meat canned in brine.

---

*Rules for rounding off numerical values (*revised*).

2. REQUIREMENTS

2.1 General — The meat used for canning shall be of good quality, obtained from the carcasses of only healthy animals, slaughtered in licensed premises, and subjected to proper ante-mortem and post-mortem inspection as prescribed in IS : 1982-1972*.

2.2 Material and Workmanship

2.2.1 Head meat, scrap meat, meat shanks, flanks and skirts and navel end of plates shall not be canned.

2.2.2 The set meat shall be freed from bones, blood clots, bruised material, all skin, hair, stringy and fibrous tissue, tendons and excessive fat. Viscera shall not be canned. Fasciae and depot fat shall be separated, as far as possible.

2.2.3 After setting, the material shall be cut into chunks or cuboids of 2·5 to 4 cm dimensions. The chunks shall be dry-cured by sprinkling with a mixture of sodium nitrate and sodium nitrite or ascorbic acid of such concentration as to ensure a desirable colour to the meat. The chunks may also be cured by any other approved process for any length of time, subject to an agreement between the purchaser and the vendor.

2.3 Freedom from Artificial Colouring Matter and Firming Agents — The material shall be free from artificial colouring matter and firming agents.

2.4 Preservatives — Preservatives, other than sodium chloride, nitrite or nitrate of sodium and potassium, shall not be used.

2.5 Tenderizing Material — Tenderizing material, either natural or artificial, to soften meat before processing, shall not be used.

2.6 The material shall be of a good flavour and shall have the characteristic flavour, typical of good canned meat. It shall be free from any objectionable odour or colour.

2.7 Hygienic Requirements

2.7.1 *Equipment and Containers Cleanliness*

2.7.1.1 All the processing systems shall be thoroughly cleaned with chlorinated water (at least 50 ppm available chlorine) after every processing run and followed by washing with potable water to remove the residual chlorine in the system.

---

*Code of practice for ante-mortem and post-mortem inspection of meat animals (*first revision*).

2.7.1.2 All the containers and lids should be cleaned thoroughly with sodium carbonate or sodium bicarbonate or any suitable detergent solution and sanitized with at least 50 ppm chlorine solution prior to their use. The residual chlorine may be removed by flushing the equipment with potable water before use.

2.7.1.3 Tables and workbenches used for cutting and packing mutton and meat should have stainless steel or aluminium alloy or marble tops. The table and workbenches top shall always be maintained in good conditions and cleaned thoroughly before and after use.

2.7.1.4 The work tables and benches used for cutting of mutton and goat meat should have on one side at least hard wood thick plank about 25 cm wide so as to prevent damage to the knives and other cutting equipment.

2.7.2 *Water Supply*

2.7.2.1 Water required for mutton and meat processing should be potable and free from contamination. The water should not be alkaline or very hard and should be free from organic matter. Presence of iron and sulphur compounds in it render it unsuitable for making brine. The water should be clear and free from odour and colour.

2.7.2.2 There shall be an adequate supply of potable water (*see* IS : 4251-1967*) free from contamination. Running water under pressure shall be available in plenty to all rooms and areas in which meat is handled and equipment are washed.

2.7.2.3 The equipment shall be so installed and used that back suction of effluent into the potable water lines is precluded.

2.7.2.4 Hot and cold water in ample supply shall be provided for plant clean-up needs, where necessary.

2.7.2.5 The storage tanks for water should, unless completely sealed, be kept covered with tight-fitting lids, examined regularly and cleaned out at least once every six months. The date of last cleaning and next cleaning shall be prominently displayed on the storage tanks.

2.7.2.6 The water shall be periodically examined as desired by the licensing authority, chemically and bacteriologically. A record of such examination shall be maintained.

2.7.3 *Employee Hygiene* — The persons handling the material shall observe strict hygienic conditions as laid down in **9** of IS : 6542-1972†.

---

*Quality tolerances for water for processed food industry.

†Code for hygienic conditions for fruit and vegetable canning units.

2.8 Requirements for the Finished Product

2.8.1 The contents of the can on opening shall not display disintegration. Excessive separation of muscle fibres resulting in a fluffy suspension shall be considered as disintegration.

2.8.2 The canned meat shall have characteristic colour and flavour.

2.8.3 The material shall be free from pieces of bristle, hair, skin and particles of bone. It shall be free from dirt, insect or rodent contamination or any other extraneous matter.

2.8.4 Poisonous and deleterious substances of any type including those of microbiological origin shall not be present.

2.8.5 *Vacuum Requirements* — The can shall give a negative pressure of not less than 250 mm Hg of vacuum at 27 ± 2°C under normal atmospheric pressure.

2.8.6 The average proportion of meat to brine shall be in the ratio of 60 : 40. A tolerance of ± 5 percent shall be permitted.

2.8.7 The material shall conform to the requirements prescribed in Tables 1 and 2.

3. PACKING AND MARKING

3.1 Packing

3.1.1 *Packing in Cans* — The material shall be packed in suitable, open-top cans.

3.1.2 *Packing in Cases* — The cans shall be packed in suitable cases. The number of cans in each case shall be subject to agreement between the purchaser and the vendor.

3.2 Marking

3.2.1 The labelling of the cans may be done either by printing or lithographing on the cans, or by attaching labels printed on paper, subject to agreement between the purchaser and the vendor.

3.2.2 The labels shall give the following information:

a) Name of the material along with brand name, if any;

b) Name and address of the manufacturer;

c) Net mass of the contents of the can;

d) Drained mass of the contents of the can;

e) Date of manufacture (this shall be embossed indelibly on one end of the can only, and the embossing shall be raised);

f) Batch or code number embossed indelibly on the can;

g) Warranty given by the manufacturer to be not less than 12 calendar months;

h) The nature of the preservative and of the canning medium used and its ingredients;

j) Declaration to the effect that no artificial colouring matter has been used; and

k) Licence number given by the Health Authorities.

TABLE 1 REQUIREMENTS FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(*Clause* 2.8.7)

Sl No.	Characteristic	Requirement	Method of Test, Ref to	
			Appendix	Other Indian Standards
(1)	(2)	(3)	(4)	(5)
i)	Sodium chloride, percent by mass:		A	—
	a) In the drained meat	1·0 to 2·5		
	b) In the brine, *Min*	1·5		
ii)	Nitrate (as sodium nitrate) in the drained meat, percent by mass, *Max*	0·05[*]	—	IS : 5960 (Part VII)-1973[†]
iii)	Nitrite as sodium nitrite in drained meat, percent by mass, *Max*	0·02[*]	—	IS : 5960 (Part VIII)-1973[‡]
iv)	Total fat, percent by mass, *Max*	1·5	—	IS : 5960 (Part III)-1970[§]
v)	Free fat, percent by mass, *Max*	0·5	—	IS : 5960 (Part IV)-1970[‖]

NOTE — Requirements for items (iv) to (v) are calculated on the total contents of a can.

[*] The limit of the combined preservatives shall not exceed 0·05 percent by mass.

[†] Methods of test for meat and meat products: Part VII Determination of nitrate content (*under preparation*).

[‡] Methods of test for meat and meat products: Part VIII Determination of nitrite content (*under preparation*).

[§] Methods of test for meat and meat products: Part III Determination of total fat content.

[‖] Methods of test for meat and meat products: Part IV Determination of free fat content.

TABLE 2 UNITS FOR METALLIC AND MICROBIOLOGICAL MUTTON & GOAT MEAT CANNED IN BRINE

(*Clause* 2.8.7)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST Ref to Appendix
(1)	(2)	(3)	(4)
i)	Arsenic, parts per million, *Max*	1	B
ii)	Lead, parts per million, *Max*	5	C
iii)	Copper, parts per million, *Max*	10	D
iv)	Zinc, parts per million, *Max*	50	E
v)	Tin, parts per million, *Max*	250	F
vi)	Microbiological tests	To satisfy the requirements of the test	G

NOTE — Requirements for items (i) to (v) are calculated on total contents of a can.

3.3 Each container may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

4. SAMPLING

4.1 The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Appendix H.

5. TESTS

5.1 Tests shall be carried out as prescribed in the relevant appendices specified in **2.8.7** and col 4 and 5 of Table 1 and col 4 of Table 2.

5.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1960*) shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

APPENDIX A

[*Table* 1, *Item* (i)]

DETERMINATION OF SODIUM CHLORIDE

A-1. REAGENTS

A-1.1 Standard Silver Nitrate Solution — 0·1 N.

A-1.2 Dilute Nitric Acid — (1 : 4), freed from lower oxides of nitrogen by boiling till colourless.

A-1.3 Ferric Alum Indicator Solution — saturated solution of ferric alum $[FeNH_4(SO_4)_2.12H_2O]$ to which a little nitric acid (6 N) has been added.

A-1.4 Standard Ammonium Thiocyanate Solution — 0·1 N.

A-2. PROCEDURE

A-2.1 Weigh about 5 g of the meat sample (cut to small pieces) or about 5 to 10 ml of the brine into a 250-ml conical flask. Pipette 25 ml of silver nitrate solution into the flask. (Use suitable sized sample, depending on expected sodium chloride content.) Add measured volume of silver nitrate solution, more than sufficient to precipite all the chloride as silver chloride. Add 15 ml of concentrated nitric acid and boil gently on sand-bath for about 10 minutes under exhaust hood. Cool to room temperature. Add 50 ml water, 5 ml of ferric alum indicator and about 2 ml of nitrobenzene. Titrate with standard ammonium thiocyanate solution until permanent light-brown colour appears. One millimetre of 0·1 N silver nitrate solution is equivalent to 5·85 mg of sodium chloride.

A-3. CALCULATIONS

A-3.1 Sodium chloride, percent by mass $= \frac{V_1 - V_2 \times 5{\cdot}85 \times 100}{M \times 1\,000}$

---

*Specification for water, distilled quality (*revised*).

where

V_1 = volume in ml of silver nitrate solution,
V_2 = volume in ml of standard ammonium thiocyanate solution, and
M = mass in g of the sample taken.

APPENDIX B

[*Table 2, Item* (i)]

DETERMINATION OF ARSENIC (MODIFIED GUTZEIT METHOD)

B-1. APPARATUS

B-1.1 The apparatus is given in Fig. 1.

B-2. REAGENTS

B-2.1 Lead Acetate Solution — 10 percent (*m/v*). Add sufficient acetic acid to obtain a clear solution.

B-2.2 Lead Acetate Paper Strips — Dry-soak filter paper strips cut to a size of 70 × 50 mm in lead acetate solution contained in a glass bottle. Before use, take out the strips and dry in an atmosphere free from hydrogen sulphide.

B-2.2.1 *Absorbent Cotton Wool Impregnated with Lead Acetate* — Saturate cotton wool with lead acetate solution, drain, press and dry under vacuum at room temperature.

B-2.3 Mercuric Bromide Solution — Dissolve 5 g of mercuric bromide in 100 ml of rectified spirit.

B-2.4 Sensitized Mercuric Bromide Paper Strips — Soak filter paper strips cut to a size of 70 × 50 mm in mercuric bromide solution contained in an amber coloured glass bottle in dark. Before use, remove the strips, press them between sheets of filter paper, and dry in an atmosphere free from hydrogen sulphide.

B-2.5 Concentrated Nitric Acid — sp gr 1·42.

B-2.6 Sulphuric Acid — approximately 5 N, and concentrated (sp gr 1·84).

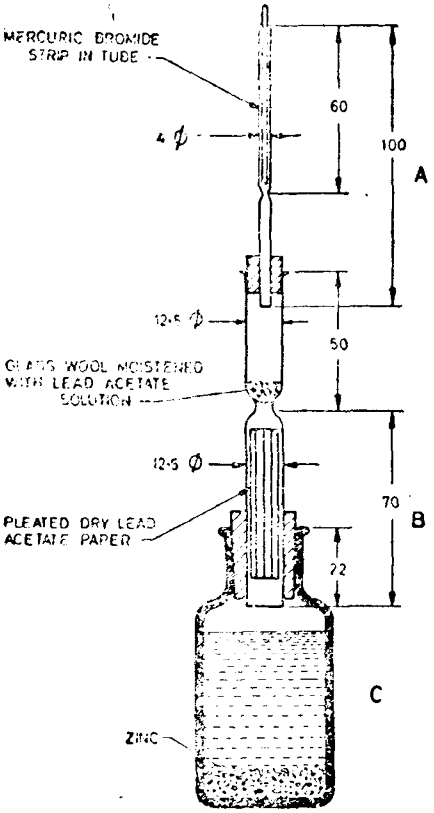
MERCURIC BROMIDE STRIP IN TUBE
4 φ
60
100
A
12·5 φ
50
GLASS WOOL MOISTENED WITH LEAD ACETATE SOLUTION
12·5 φ
70
B
PLEATED DRY LEAD ACETATE PAPER
22
C
ZINC

FIG. 1 APPARATUS FOR MODIFIED GUTZIET TEST FOR ARSENIC

B-2.7 Hydrochloric Acid

B-2.8 Potassium Iodide Solution — 15 percent (*m/v*).

B-2.9 Stannous Chloride Solution — Dissolve 40 g of stannous chloride in 100 ml of hydrochloric acid. Discard this solution if an appreciable deposit forms.

B-2.10 Zinc — granulates of size 0·5 to 1·0 mm; arsenic-free.

B-2.11 Standard Arsenic Stock Solution — Weigh, to the nearest 0·1 mg, 0·1320 g of arsenic trioxide and transfer to a 100-ml beaker. Dissolve the arsenic trioxide in 2 ml of sodium hydroxide solution, prepared by dissolving 50 g of sodium hydroxide in one litre of water. Transfer the solution to a 1 000-ml volumetric flask. Wash the beaker several times, collect the washings in the volumetric flask and make up the volume. One millilitre of this standard solution contains 100 µg of arsenic.

B-2.11.1 *Standard Arsenic Solution* — Take 25 ml of the standard arsenic solution (**B-2.11**), in a 1 000 ml volumetric flask and make up the volume. Prepare this solution only the time of use. One millilitre of this standard solution contains 2·5 µg of arsenic.

B-3. PROCEDURE

B-3.1 Preparation of the Solution — Weigh accurately about 5 g of the well-mixed sample, transfer to a 500-ml Kjeldahl digestion flask and wet with 25 to 50 ml of concentrated nitric acid. Add 10 to 20 ml of concentrated sulphuric acid and heat cautiously. Add concentrated nitric acid dropwise from time to time from a pipette to speed up the oxidation of the material. Note the total amount of concentrated sulphuric acid and nitric acid added. When the oxidation is complete and the solution is colourless, add 20 ml of water and again boil to fuming. Cool and dilute with water to 50 ml in a graduated flask and call this as *prepared solution*. Take a suitable aliquot for the estimation of arsenic and reserve the rest for the determination of other heavy metals.

B-3.2 Prepare the solution of the material as specified in the individual material specification. Place the dry lead acetate paper in the lower portion of the tube *B* and cotton wool moistened with lead acetate in its upper portion. Place the sensitized strip of mercuric bromide paper into tube A and connect the tubes together with a rubber stopper. Introduce a suitable aliquot of the solution of the material into the bottle C and add 10 ml of dilute sulphuric acid. Add 0·5 ml of stannous chloride solution, 5 ml of potassium iodide solution and make up the volume with water to about 50 ml. Mix the contents and drop about 10 g of zinc. Fit in position, the rubber stopper carrying the tube B immediately. Place the bottle in a warm place at about 40°C. Remove the test strips after 40 minutes with the help of tweezers. Conduct the test in exactly similar manner using a volume of standard arsenic solution as specified in the material specification, in place of the solution of the material and compare the stain produced with the material with that produced with the arsenic solution.

B-3.2.1 The limit prescribed in the material specification shall be taken as not having been exceeded if the length of the stain as well as the intensity of its colour produced in the test with the material is not greater than that produced with the corresponding standard arsenic solution.

APPENDIX C

[*Table 2, Item* (ii)]

DETERMINATION OF LEAD

C-1. REAGENTS

C-1.1 Citric Acid — solid.

C-1.2 Ammonium Hydroxide Solution — sp gr 0·88 or diluted as required.

C-1.3 Potassium Cyanide Solution — 10 percent (*m/v*).

C-1.4 Dithizone (Diphenyl Thiocarbazone) Solution — 0·1 percent (*m/v*) in chloroform, freshly prepared.

C-1.5 Dilute Hydrochloric Acid — approximately 0·1 N.

C-1.6 Standard Lead Solution — Two reference solutions of lead nitrate are required in this test as given under **C-1.6.1** and **C-1.6.2**.

C-1.6.1 *Standard Strong Lead Solution* — obtained by dissolving 0·160 0 g of lead nitrate [$Pb(NO_3)_2$] in 50 ml of dilute nitric acid and making up the volume in a 100-ml graduated flask.

C-1.6.2 *Standard Dilute Lead Solution* — freshly prepared before the test by diluting 1 ml of the standard strong lead solution to 100 ml with water in a graduated flask.

C-1.7 Ammonium Acetate — solid.

C-1.8 Sodium Sulphide Solution — 10 percent (*m/v*).

C-2. PROCEDURE

C-2.1 Take a suitable aliquot of the *prepared solution* (*see* **B-3.1**), and 2 g of citric acid and just neutralize with ammonia. Add 1 ml of the potassium cyanide solution and transfer the whole to a separating funnel. Extract the liquid with the dithizone solution. Carry out 3 extractions, using 10 ml for the first extraction and 5 ml each for the subsequent extractions. If the last extraction gives any indication of a reddish tinge, extract again to ensure complete removal of lead.

C-2.2 Take 10 ml of water in another separating funnel and wash each extract with this water. If suspended matter is present in the chloroform extract, this shall be filtered before passing to the separating funnel containing 10 ml of wash water. Transfer the combined chloroform extracts to a separating funnel and extract lead by shaking successively with 50, 20 and 10 ml of dilute hydrochloric acid. Combine the acid extracts in a separating funnel, wash once or twice with 10 ml of chloroform and filter through a previously wetted filter paper into a 100-ml graduated flask. Make up the volume of the filtrate to 100 ml with dilute hydrochloric acid and use this as the test solution.

C-2.3 Transfer a suitable volume of the test solution to a Nessler cylinder. Add 2 g of ammonium acetate, followed by ammonia until just alkaline and then 1 ml of potassium cyanide solution. Dilute to 50 ml, add 2 drops of sodium sulphide solution and compare the colour produced with the standard dilute lead solution (as specified in the material specification) in the same way.

C-2.4 The limit prescribed in the material specification shall be taken as not having been exceeded if the intensity of its colour produced in the test with the material is not more than the one produced with the corresponding standard lead solution.

APPENDIX D

[*Table 2, Item* (iii)]

DETERMINATION OF COPPER

D-1. APPARATUS

D-1.1 Spectrophotometer

D-2. REAGENTS

D-2.1 Citric Acid — solid.

D-2.2 Ammonium Hydroxide Solution — sp gr 0·90.

D-2.3 Sodium Diethyldithiocarbamate Solution — 0·1 percent (*m*/*v*) aqueous.

D-2.4 Carbon Tetrachloride — redistilled.

D-2.5 Sodium Sulphate — anhydrous.

D-2.6 Dilute Nitric Acid — concentrated nitric acid of sp gr 1·42 diluted with an equal volume of water.

D-2.7 Standard Copper Solution — Weigh accurately 0·100 0 g of pure copper turnings, carefully dissolve in the minimum amount of nitric acid, cool and dilute to one litre in a graduated flask. Pipette 10 ml of this solution into a 100-ml graduated flask and dilute to the mark. One millilitre of this solution contains 10 µg of copper.

D-3. PROCEDURE

D-3.1 Transfer a 10-ml aliquot of the test solution (*see* **B-3.1**) to a separating funnel. Add one gram of citric acid and dissolve it by shaking. Make the solution alkaline to litmus by adding ammonium hydroxide solution in small quantities. Add 5 ml of the sodium diethyldithiocarbamate solution, shake thoroughly and extract with 5-ml portions of carbon tetrachloride until the final extract is colourless. Dry the combined extracts by shaking thoroughly with anhydrous sodium sulphate. Filter the dry extract and wash the filter paper with carbon tetrachloride. Make up the volume of the filtrate to 25 ml with carbon tetrachloride and measure the absorption at 437 nm by means of the spectrophotometer. Simultaneously carry out blank determinations on the water and the reagents.

D-3.2 Prepare a series of standards by treating aliquots of the standard copper solution (*see* **D-2.7**) in the same manner as the test solution. From the absorption of the standard solutions, prepare a standard curve plotting absorption values against concentration. From the curve, obtain the mass of copper present in the test solution.

APPENDIX E

[*Table* 2, *Item* (iv)]

DETERMINATION OF ZINC

E-1. APPARATUS

E-1.1 Spectrophotometer

E-2. REAGENTS

E-2.1 Methyl Red Indicator Solution — one percent (*m*/*v*), aqueous.

E-2.2 Copper Sulphate Solution — Dissolve 8 g of copper sulphate ($CuSO_4.5H_2O$) in water and dilute to one litre. One millilitre of this solution contains 2 mg of copper.

E-2.3 Ammonium Hydroxide Solution — redistilled, sp gr 0·90.

E-2.4 Concentrated Hydrochloric Acid — sp gr 1·16.

E-2.5 Hydrogen Sulphide Gas — passed through a wash bottle containing water.

E-2.6 Dilute Hydrochloric Acid — 5 percent (*m/v*).

E-2.7 Bromine Water — saturated.

E-2.8 Phenol Red Indicator Solution — 0·04 percent (*m/v*). Dissolve 0·1 g of phenol red in 28·2 ml of 0·01 N sodium hydroxide and dilute to 250 ml with water.

E-2.9 Hydrochloric Acid (1 : 1) — Dilute concentrated hydrochloric acid with an equal volume of water.

E-2.10 Ammonium Citrate Solution — Dissolve 225 g of ammonium citrate in water, make alkaline to phenol red with ammonium hydroxide solution and add 75 ml in excess. Dilute to 2 litres. Extract this solution immediately before use as follows:

> ' Add to the solution a slight excess of the dithizone solution and extract with carbon tetrachloride until the solvent layer is clear bright-green. Remove the excess of dithizone by repeated extraction with chloroform and finally extract once more with carbon tetrachloride.'

NOTE — It is essential that excess dithizone be entirely removed, otherwise zinc will be lost during the elimination of cobalt and nickel.

E-2.11 Dimethylglyoxime Solution — Dissolve 2 g of dimethylglyoxime in 10 ml of ammonium hydroxide solution and 200 to 300 ml of water, filter and dilute to one litre.

E-2.12 α-Nitroso-β-Naphthol Solution — Dissolve 0·25 g of α-nitroso-β-naphthol in chloroform and dilute to 500 ml with chloroform.

E-2.13 Chloroform — redistilled.

E-2.14 Dithizone (Diphenylthiocarbazone) Solution — Dissolve 0·05 g of dithizone in 2 ml of ammonium hydroxide solution and 100 ml of water and extract repeatedly with carbon tetrachloride until the solvent layer is clear bright-green in colour. Discard the solvent layer and filter the aqueous portion through a washed ashless filter paper. (This solution is prepared fresh since it is only moderately stable even when kept in the dark and under refrigeration).

E-2.15 Carbon Tetrachloride — redistilled.

E-2.16 Hydrochloric Acid — approximately 0·04 N.

E-2.17 Stock Solution of Zinc — Dissolve exactly 0·500 g of pure granulated zinc in slight excess of dilute hydrochloric acid and dilute to one litre in a graduated flask.

E-2.18 Standard Solution of Zinc — At the time of the experiment, dilute 10 ml of the stock solution of zinc (*see* **E-2.17**) to 1 000 ml with hydrochloric acid (0·04 N). One millilitre of this solution contains 5 µg of zinc.

E-3. PROCEDURE

E-3.1 Separation of Sulphide Group — Take a suitable aliquot of the *prepared solution* (*see* **B-3.1**) estimated to contain 25 to 100 µg of zinc, add 2 drops of methyl red indicator solution and 1 ml of copper sulphate solution, and neutralize with ammonium hydroxide solution. Add sufficient quantity of concentrated hydrochloric acid to make the solution about 0·15 N with respect to this acid (about 0·75 ml excess in 50 ml of solution is satisfactory). The *p*H of the solution at this point should be 1·9 to 2·1 when measured with a glass electrode. Pass a stream of hydrogen sulphide gas into the solution until precipitation is complete. Filter the contents of the flask through a fine textured filter paper (Whatman No. 42 or equivalent) that has been previously fitted into the funnel and washed first with dilute hydrochloric acid and then with water. Collect the filtrate in a beaker and wash the flask and the filter with 3 to 4 small portions of water. Boil the filtrate gently until the odour of hydrogen sulphide is no longer detected; then add 5 ml of bromine water and continue boiling until bromine has been expelled. Allow the solution to cool, neutralize with ammonium hydroxide solution using phenol red as indicator and then make it slightly acidic with hydrochloric acid (1 : 1) by adding an excess of 0·2 ml. Dilute the resultant solution in a graduated flask to contain 0·2 to 1·0 µg of zinc per millilitre.

E-3.2 Elimination of Nickel and Cobalt — Transfer a 20-ml aliquot of the solution (obtained under **E-3.1**) to a separating funnel. Add to it 5 ml of ammonium citrate solution, 2 ml of dimethylglyoxime solution and 10 ml of α-nitroso-β-naphthol solution. Shake the contents of the funnel for two minutes. Discard the lower layer and extract the aqueous layer with 10 ml of chloroform to remove residual α-nitroso-β-naphthol. Discard the chloroform layer.

E-3.3 Isolation and Estimation of Zinc

E-3.3.1 To the aqueous layer obtained after eliminating nickel and cobalt (*see* **E-3.2**), which at this point has a *p*H of 8·0 to 8·2, add 2·0 ml of the dithizone solution and 10 ml of carbon tetrachloride. Shake for two minutes. Allow the layers to separate and remove the aqueous layer as completely as possible, withdrawing it by means of a pipette attached to the vacuum line. Wash down the sides of the separating funnel with about 25 ml of water and draw off the aqueous layer without shaking. Add

25 ml of hydrochloric acid (0·04 N) to the carbon tetrachloride layer in the separating funnel and shake for one minute to transfer the zinc to the acid-aqueous layer. Drain off and discard the carbon tetrachloride layer taking care to dislodge and remove the drop that usually floats on the surface. To the acid-aqueous layer, add 5·0 ml of ammonium citrate solution and 10·0 ml of carbon tetrachloride (*p*H of the solution at this point is 8·8 to 9·0). Determine the volume of the dithizone solution to be added as given in **E-3.3.1.1**.

E-3.3.1.1 Pipette 4·0 ml of the standard solution of zinc into a separating funnel, add to it 21 ml of hydrochloric acid (0·04 N) from a burette, 5 ml of ammonium citrate solution, 10·0 ml of carbon tetrachloride and then add the dithizone solution in 0·1-ml increments, shaking briefly after each addition until a faint yellow colour in the aqueous layer indicates a bare excess of the reagent. Note the total volume of the dithizone solution added. Multiply this volume by 1·5.

E-3.3.2 Add the volume (calculated under **E-3.3.1.1**) of the dithizone solution to the solution contained in the separating funnel (*see* **E-3.3.1**) and shake it for two minutes. Pipette 5·0 ml of the carbon tetrachloride layer and transfer it to the spectrophotometer cell. Dilute the solution with 10·0 ml of carbon tetrachloride, mix and determine its transmission at 540 nm.

NOTE — Dilution may be made in a clean dry test tube if the design of the cell does not permit direct mixing.

E-3.3.3 Pipette into a series of separating funnels 0, 1, 2, 3 and 4 ml of the standard solution of zinc and add the necessary volume of hydrochloric acid (0·04 N) to make 25 ml. Add into each separator 5·0 ml of the ammonium citrate solution and the calculated volume of the dithizone solution. Shake the separating funnels for two minutes. From the first separating funnel, pipette out 5·0 ml of the carbon tetrachloride layer and transfer it to the spectrophotometer cell. Dilute the solution with 10·0 ml of carbon tetrachloride, mix and determine its transmission at 540 nm. Proceed in the same manner with the solutions contained in other separating funnels.

E-3.3.4 Plot the transmittance for each of the series of separating funnels on logarithmic scale against concentration of zinc in micrograms present in 25 ml of the diluted standard zinc solution in the particular separating funnel and solution in the particular separating funnel and draw a smooth curve through the points. (Intercept of this curve may vary from day to day depending on the actual concentration of dithizone used in the final extraction, but the slope of the curve should remain essentially the same). From this curve, obtain the mass of zinc in micrograms.

APPENDIX F

[*Table* 2, *Item* (v)]

DETERMINATION OF TIN

F-1. REAGENTS

F-1.1 Ammonium Hydroxide Solution — sp gr 0·90.

F-1.2 Concentrated Hydrochloric Acid — sp gr 1·16.

F-1.3 Dilute Sulphuric Acid — 1 : 3 by volume.

F-1.4 Hydrogen Sulphide Gas — passed through a wash bottle containing water.

F-1.5 Wash Solution — Mix 100 ml of saturated ammonium acetate solution with 50 ml of glacial acetic acid and 850 ml of water.

F-1.6 Ammonium Polysulphide Solution — Pass hydrogen sulphide gas through 200 ml of ammonium hydroxide solution contained in a bottle immersed in ice-cold water until no more gas is absorbed, add 200 ml of ammonium hydroxide solution and dilute with water to make 1 000 ml. Add 25 g of flowers of sulphur to this solution and keep for several hours to digest the sulphur and then filter. Use the filtrate.

F-1.7 Dilute Acetic Acid — 1 : 9 by volume.

F-2. PROCEDURE

F-2.1 Take a suitable aliquot of the test solution (*see* **B-3.1**), dilute to 400 ml, cool and add ammonium hydroxide solution until the contents are alkaline. Add 20 ml of either concentrated hydrochloric acid or dilute sulphuric acid. Cover the beaker with a watch glass. Heat the solution to about 95°C and pass a slow stream of hydrogen sulphide gas through it for one hour. Digest the mixture at 95°C for one hour and allow it to stand for another 30 minutes. Filter the contents of the beaker through a quantitative filter paper and wash the residue of stannous sulphide on the filter, alternately with three portions each of wash solution and hot water. Transfer the residue along with the filter paper to a 50-ml beaker, add 10 to 20 ml of ammonium polysulphide solution, heat to boiling and filter by decantation. Add 10 ml of ammonium polysulphide solution, boil and filter again. Repeat this once more and finally wash the filter paper with hot water. Acidify the combined filtrate and washings with dilute acetic acid, gently boil for one hour and allow to stand overnight. Filter the resulting mixture through a double 11-cm ashless filter paper. Wash the filter paper alternately with two portions each of the wash solution and hot water. Transfer the residue along with the filter paper to a tared porcelain crucible and dry it thoroughly in an air oven. Carefully ignite the filter paper, using a Bunsen flame and incinerate the contents to convert the sulphide to oxide. Partly cover the crucible and heat strongly over a Bunsen or Meker burner. (The sulphide shall be gently roasted to the oxide which may then be heated to a high temperature without loss by volatilization.)

F-2.2 Cool the crucible in a desiccator and weigh as stannic oxide (SnO_2). Repeat the process of heating, cooling and weighing till the difference between two successive weighings is less than one milligram. Note the lowest mass. Obtain the mass of metallic tin from the weight of stannic oxide (SnO_2) by using the factor 0·787 7.

APPENDIX G

[*Table 2, Item* (vi)]

TEST FOR MICROBIOLOGICAL REQUIREMENT

G-1. GENERAL

G-1.1 The test consists of the incubation of the cans at 37° and 55°C for not less than 14 days and their examination at the end of this period for evidence of microbiological activity. To satisfy the requirements of this test, the cans shall not show evidence of microbiological activity of any type. The incubated cans shall be considered to have undergone microbiological spoilage if any can:

- a) shows a positive pressure;
- b) bulges when being incubated or remains bulged after incubation;
- c) leaks; and
- d) whether having a positive pressure or not, shows evidence of bacterial proliferation as judged by:
    - 1) a significant change in *p*H value,
    - 2) disintegration or digestion of the meat as compared with the unincubated samples,
    - 3) microscopic examination of direct smears, and
    - 4) culture methods for testing bacterial multiplication and presence of pathogenic bacteria.

G-2. APPARATUS

G-2.1 Glassware — All the glass apparatus used in the microbiological examination shall be sterile. Sterilization shall be performed for at least two hours at 170°C in dry heat.

G-2.2 Vacuum-Pressure Recorder — preferably with an electric recording type of instrument. Alternatively, a vacuum gauge of the piercing type may be used.

G-2.3 Accessories — can-opener of the puncturing type, cork borers, sampling tubes, spoons, and cotton wool — all sterile.

G-3. REAGENTS

G-3.1 Petroleum Ether

G-3.2 Mercuric Chloride Solution — 1·0 percent (*m/v*).

G-3.3 Carbolic Acid Solution — 1·5 percent (*m/v*).

G-3.4 Ethyl Alcohol Solutions — 95 percent, 97 and 98 percent (*m/v*).

G-3.5 Chloroform

G-3.6 Formaldehyde — 40 percent (*m/v*).

G-3.7 Sterile Normal Saline or Ringers Solution

G-3.7.1 *Normal Saline* — 0·9 percent (*m/v*) solution of sodium chloride (analytical reagent grade).

G-3.7.2 *Ringers Solution* — It has the following composition:

Sodium chloride	0·2 g
Potassium chloride	0·42 g
Calcium chloride	0·48 g
Sodium carbonate	0·2 g
Distilled water	1 000 ml (glass-distilled)

The above solution is diluted to quarter strength when actually in use.

G-3.8 Sterile Vaseline — Alternatively, sterile liquid paraffin wax may be used.

G-4. MEDIA

G-4.1 Dextrose-Tryptone Broth or Dextrose-Nutrient Broth

G-4.1.1 *Dextrose-Tryptone Broth* — Mix 10 g of tryptone, 5 g of dextrose, 0·04 g of bromo-cresol-purple and one litre of water. Steam the mixture untile dissolved. Adjust the *p*H to 6·8 to 7·0. Filter and tube in 10-ml quantities and autoclave at 121°C for 30 minutes.

G-4.1.2 *Dextrose-Nutrient Broth* — Mix 3 g of beef extract, 5 g of peptone, 20 g of dextrose and one litre of water. Warm to dissolve, tube in 10-ml quantities and autoclave at 121°C for 30 minutes. Alternatively, dissolve 5 g of peptone, 5 g of glucose and 5 g of dipotassium hydrogen phosphate (K_2HPO_4) in water, filter, cool and make up the volume to one litre. Tube in 10-ml quantities and sterilize by steaming for 30 minutes for 3 successive days, each steaming followed by storage at room temperature.

G-4.2 Dextrose-Tryptone Agar — To the dextrose-tryptone broth prepared as in **G-4.1.1**, add 20 g of powdered agar just before sterilization and steam to dissolve. Tube in quantities of 20 to 25 ml and autoclave at 121°C for 30 minutes.

G-4.3 Sulphite Agar — Mix 10 g of tryptone, one gram of sodium sulphite, 20 g of agar powder, 0·1 g of ferric citrate and one litre of water. Warm to dissolve and tube in 10-ml quantities. Autoclave at 121°C for 30 minutes. Alternatively, omit adding ferric citrate, adjust the *p*H to 7·0 and add a bright sand-papered iron nail into each tube and sterilize.

G-4.4 Liver Broth or Sodium Thioglycollate

G-4.4.1 *Liver Broth* — Boil 500 g of well-minced degutted beef liver in 100 ml of distilled water for one hour. Adjust the *p*H of the mixture to 7·0 and boil further for 10 minutes. Cool and separate all fat by straining through several layers of muslin and make up the volume to one litre with water. Add 10 g of peptone, one gram of dipotassium hydrogen phosphate and again adjust the *p*H to 7·0. Tube in 10-ml quantities, add to each tube 2 g of liver particles and autoclave at 121°C for 30 minutes. Before use, boil the medium for 10 to 15 minutes to remove dissolved air. Cool the tube before inoculation. The medium may furthur be improved by sealing with paraffin wax or liquid paraffin.

G-4.4.2 *Sodium Thioglycollate Medium* — To 100 ml of glucose nutrient broth, add one gram of powdered agar and one g of sodium thioglycollate. Autoclave in bulk at 115°C for 20 minutes. Tube in 10-ml quantities and autoclave at 121°C for 30 minutes. This medium acts as an anaerobic medium and requires no further preparation or special conditions for use. It can straightaway be used as an anaerobic medium in an ordinary incubator.

Alternatively, for a sugar-free base medium useful for fermentation reactions, the following formula may be employed:

Proteose pepton	20 g
Sodium chloride	5·0 g
Sodium thioglycollate	1·0 g
Agar	1·0 g
Distilled water	1 000 ml

Sugars as required are added up to 1·0 percent to the base just before tubing and sterilization.

G-4.5 Endos Agar or Eosin Methylene Blue Agar

G-4.5.1 *Endos Agar (Levines Formula)* — Mix 10 g of peptone, 2·5 g of dipotassium hydrogen phosphate 15·3 g of agar and one litre of water. Boil the mixture until dissolved. Make up the loss due to evaporation with water. Sterilize at 121°C for 20 minutes. Just before use, for every 100 ml of the solution, add the following solution:

Lactose solution (20 percent, *m/v*)	5 ml
Basic fuchsine (10 percent, *m/v*), alcoholic	0·5 ml
Sodium sulphite solution (10 percent, *m/v*), freshly prepared	2·5 ml

Sterilize for 20 minutes at 121°C. The basic fuchsine solution should be freshly prepared and added just before sterilization.

G-4.5.2 *Eosin Methylene Blue Agar (Holt, Harris and Teague)* — This medium is used for differentiating *Escherichia coli* from *Eberthella typhosa* and has the following composition:

Peptone	10 g
Agar	15 g
Lactose	5 g
Sucrose	2 g
Dipotassium hydrogen phosphate	2 g
Eosin Y	0·2 g (added as 20 ml of 2 percent aqueous solution)
Methylene blue	0·05 g (added as 20 ml of 0·5 percent aqueous solution)
Distilled water	1 000 ml

If necessary, the *p*H may be adjusted to 6·5 to 7·0.

G-4.6 Brilliant Green Lactose Saccharose Phenol Red Agar or Brilliant Green Lactose Bile

G-4.6.1 *Brilliant Green Lactose Saccharose Phenol Red Agar* — Dissolve 10 g of peptone, 5 g of meat extract, 5 g of sodium chloride and 20 g of agar in 1 000 ml of water by boiling for 30 minutes. Filter through flannel. Adjust the *p*H to 7·2. Sterilize for 30 minutes at 110°C. Take 1 000 ml of melted agar medium, add aseptically a solution consisting of 10 g of lactose and 10 g of saccharose in 80 ml of 0·005 N sodium hydroxide solution containing one percent of phenol red. This solution should be sterilized by boiling at 100°C for 10 minutes. Finally, add 2 ml of brilliant green solution (0·5 percent, *m/v*). No resterilization is required.

G-4.6.2 *Brilliant Green Lactose Bile* (*Muer and Harris*) — The medium has the following composition:

Dried oxgall	50 g
Peptone	10 g
Lactose	10 g
Brilliant green	0·1 g
Distilled water	1 000 ml

The distilled water is heated on a water-bath. The oxgall is added with the peptone and dissolved. Boiling is continued for one hour. The lactose is then added. The solution is filtered and 10 ml of one percent solution of brilliant green is added. The medium is sterilized in tubes for 15 minutes.

G-4.7 MacConkey Broth (Single Strength) — This medium has the following composition:

Sodium taurocholate	5 g
Lactose	10 g
Peptone	20 g
Sodium chloride	5 g
Distilled water	1 000 ml

Steam the mixture for about 2 hours and keep in a refrigerator overnight. Filter in the morning while cold. Adjust *p*H to 7·4 using phenol red as indicator. Add 10 ml of neutral red indicator solution (one percent, *m/v*). Distribute the medium into culture tubes in 5-ml portions. The culture tubes should have Durham fermentation tubes in them. Sterilize the medium for 3 days at 10·346 N/m^2 pressure. When ready, the medium should have a light claret red colour and should be free from magenta or yellow tints.

G-4.8 S.S. Agar Medium for Salmonella and Shigella — The growth of coliform organisms is considerably inhibited on this medium. If growth occurs at all, the colonies are red or pink centred while salmonella and shigella colonies are colourless. The medium has the following composition:

Bile salt agar base (prepared as in **G-4.8.1**)	1 000 ml
Lactose	10 g
Sodium citrate	8·5 g
Sodium thiosulphate	8·5 g
Ferric citrate	1·0 g
Neutral red (one percent, aqueous)	2·5 ml
Brilliant green (0·1 percent, aqueous)	0·33 ml

Add the dry ingredients to the hot, melted agar base and mix thoroughly to dissolve. Adjust the *p*H to 7·0. Add the neutral red and brilliant green solutions. Mix well. Do not autoclave. Pour 15 to 20-ml amounts into sterile petri dishes and allow the plates to stand with the top partially lifted for two hours or so until the surface is quite dry.

G-4.8.1 *Bile Salt Agar Base* — It has the following composition:

Beef extract	5 g
Proteose peptone	5 g
Bile salts	8·5 g
Agar	17 g
Distilled water	1 000 ml

Dissolve the dry ingredients in water by heating on water-bath or in autoclave. Restore the original volume by adding water. Distribute into flasks in 100-ml portions and autoclave at 121°C for 30 minutes.

G-4.9 Tetrathionate Broth — This is useful for the primary isolation of salmonella (including the typhoid bacillus) and for inhibiting the growth of coliform organisms. It is prepared as follows:

G-4.9.1 *Tetrathionate Broth Base*

Proteose peptone	5 g
Bile salts	1 g

Calcium carbonate	10 g
Sodium thiosulphate	30 g
Brilliant green (0·1 percent, aqueous)	11 ml
Distilled water	1 000 ml

Dissolve peptone and bile salts in water. Distribute in flasks in 500 ml quantities. Add 5 g of calcium carbonate to each flask. Autoclave at 121°C for 10 minutes. Add 15 g of sodium thiosulphate and 5·5 ml of brilliant green solution to each flask and mix thoroughly. Distribute aseptically into tubes in 10-ml portions. Keep suspension of calcium carbonate uniform by agitation.

G-4.9.2 *Iodine Solution*

Iodine crystals	30 g
Potassium iodide	25 g
Distilled water	100 ml

Dissolve the ingredients in water.

G-4.9.3 Just before inoculating add 0·2 ml of iodine solution to each of the tetrathionate broth base tubes. Add 1 to 3 g of the specimen to one tube of the medium. Mix thoroughly by swirling and incubate for 24 hours. After the full period of incubation, streak on S. S. agar plates (*see* **G-4.8**) and the MacConkey broth (*see* **G-4.7**).

G-5. PROCEDURE

G-5.1 Preparation of the Can

G-5.1.1 All the identification marks, brand marks, batch number, date and other information available on the label or embossed on the tin shall be noted. The label shall be removed and all physical defects, such as rust, pin-holding, dents, signs or defective seaming of end plates and of defective side seams, shall be recorded and points, if any, for examination after the can is opened shall be noted.

G-5.1.2 The can shall be thoroughly scrubbed with soap and water. If necessary, apply petroleum ether and clean. After washing with soap, immerse in a tall container filled with mercuric chloride solution or carbolic acid solution. The immersion shall be for at least one hour.

G-5.1.3 After removing from the antiseptic bath, clean the exterior of the can with sterile cotton wool. When dry, scrub well with sterile cotton wool dipped in ethyl alcohol (97 percent). Cover the top of the can with sterile petri dish.

G-5.2 Recording of the Vacuum or Pressure

G-5.2.1 This recording is done preferably with an electric recording type of instrument without opening the can. If such an instrument is not available, the recording may be done with a vacuum-pressure gauge of the piercing type.

G-5.2.2 *Recording of Vacuum or Pressure with a Vacuum-Pressure Gauge*

G-5.2.2.1 The site of the opening to be made shall be thoroughly sterilized by any of the following methods:

a) Pour ethyl alcohol (95 percent), freely on the top-end plate and set fire. Flame the petri dish freely and close the end plate with the dish immediately after the alcohol has burnt down.

b) Hold the can in the hand and heat the end plate freely in a Bunsen flame waving the end plate against the flame with a circular motion so as to protect the contents against scorching. Cover with a sterile petri dish as before.

c) In case the can is bulged, it is not safe to directly flame it. It can be sterilized by swabbing freely with a mixture of ethyl alcohol (98 percent) and chloroform or formaldehyde after washing with soap and water.

G-5.2.2.2 After flaming, allow the can to remain under the sterile petri dish until quite cool (30 minutes would do) and then pierce the point of opening by means of a sterile vacuum-pressure gauge of the piercing type under aseptic conditions. Record the vacuum or positive pressure as the case may be. Cover the opening immediately after removing the vacuum-pressure gauge.

G-5.3 Preparation of the Sample for Bacteriological Tests — Enlarge under aseptic conditions the puncture with a thoroughly sterilized can-opener to give an opening of 2·5 cm diameter. If a cutting type of instrument is used, cut a triangle with a base of 2·5 cm and sides 5 cm long. Cover the enlarged opening at once with sterile petri dish.

G-5.4 Removal of the Inoculum

G-5.4.1 *Removal of Liquid Inoculum* — The inoculum is especially removed by means of a sterile pipette graduated in millilitres. It is essential that the rear end of the pipette be plugged for a length not less than 1·5 cm with sterile cotton wool. Deliver 2 ml of the inoculum to each of the broth tubes and one millilitre to each of the melted agar tubes. Mix well to ensure uniform distribution and pour into the petri dishes, swirling so as to obtain uniform spread. Alternatively, pour 2 ml of the inoculum into the petri dish and then add the melted agar medium and mix by swirling.

G-5.4.2 *Removal of Solid Inoculum* — For removing the samples of solid material, use sterile cork-borers or sample tubes or spoons. If spoons are used, the contents of the can should be thoroughly mixed before taking the sample. Remove about 15 g of the sample and transfer it to a sterile flask containing 50 ml of sterile water or sterile normal saline or sterile Ringers solution. The flask should contain at least a dozen sterile glass beads to facilitate mixing. Mix by swirling for at least 5 minutes. Take out 2-ml portions of the inoculum and add them to both the broths and the agars.

G-5.5 Preparation of the Anaerobic Culture — The dextrose-tryptone-broth and the liver-broth media are rendered anaerobic by sealing the access to air by placing a layer of sterile vaseline, liquid paraffin, liquid agar or paraffin wax on the top of the medium. This layer should be not less than 1·5 cm in thickness. Just before using the culture tubes, exhaust the media by packing the tubes for at least 10 minutes in a water-bath and maintain the water-bath at 70°C until the media are used. Inoculate the medium below the paraffin agar layer with as little disturbance as possible and cool the medium after inoculation in a cold water-bath so that the top seal is set.

G-5.6 Incubation

G-5.6.1 Incubate the inoculated tubes as follows:

a) *Dextrose-tryptone broth* — two tubes each, aerobically and anaerobically at 37°C for 3 to 5 days and similarly at 55°C for 3 to 5 days.

b) *Sulphite agar* — one tube each at 37° and 55°C for 5 days.

c) *Liver broth or sodium thioglycollate* — two tubes anaerobically at 37°C and two tubes at 55°C for 5 days.

d) *Endos agar* — at 37°C for 48 hours.

e) *Brilliant green lactose saccharose phenol red agar* — at 37°C for 48 hours.

f) *MacConkey broth* — is inoculated with at least 5 ml of the inoculum and incubated at room temperature for 48 hours.

g) *S. S. agar* — is incubated at 37°C for 48 hours.

G-5.6.2 In the case of a blown can, run a separate series of culture tubes parallel to the tubes from the sound can. The incubation period is the same as given in **G-5.6.1**.

G-5.7 Examination of the Culture After Incubation

G-5.7.1 In case there is growth in the nutrient broth tubes, streak them on agar plates and incubate. Examine the contents of each culture tube for the organisms of the following types:

a) Spoilage types,
b) Potential spoilage types, and
c) Pathogenic types.

G-5.7.2 In case there is a growth of cocci, establish their nature by streaking them on blood agar and study ability for haemolysis and nature by (a) coagulase tests, and (b) microscopic examination.

G-5.8 Examination of the Cans After the Removal of the Inoculum

G-5.8.1 After the removal of the inoculum from the cans, carry out the following tests:

a) Prepare a direct smear of the contents. Stain by Gram's method or methyl violet and examine the preparations microscopically.
b) Determine the *p*H value.
c) Examine the contents for deterioration, discolouration, disintegration and other signs of spoilage.

G-5.8.2 Correlate the above findings with the incidence and nature of microflora and conclude about the cause of the spoilage, if any.

APPENDIX H

(*Clause* 4.1)

SAMPLING OF MEAT CANNED IN BRINE

H-1. GENERAL REQUIREMENTS OF SAMPLING

H-1.1 Sampling shall be done by a person agreed to between the purchaser and the vendor and in the presence of the purchaser (or his representative) and the vendor (or his representative).

H-1.2 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

H-2. SCALE OF SAMPLING

H-2.1 Lot — In any consignment, all the cases containing cans of the same size and from the same batch of manufacture shall be grouped together to constitute a lot.

H-2.1.1 Samples shall be tested for each lot for ascertaining conformity of the material to the requirements of this specification.

H-2.2 The number of cans to be selected from the lot for testing the physical and chemical requirements shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 3. In addition to this, 2 cans shall be selected for testing for requirements of free fat and 8 cans shall be selected for testing for microbiological requirements.

TABLE 3 SELECTION OF CANS FOR TESTING

NUMBER OF CANS IN THE LOT N (1)	NUMBER OF CANS TO BE SELECTED n (2)
Up to 200	4
201 to 500	5
501 ,, 800	6
801 ,, 1 300	7
1 301 ,, 3 200	8
3 201 ,, 8 000	9
8 001 and above	10

H-2.3 These cans shall be selected at random from a number of packing cases as agreed to between the purchaser and the vendor (or manufacturer). Subject to such an agreement, the minimum number of packing cases to be opened may be in accordance with Table 4. The cans required as in **H-2.2** shall then be drawn at random, equally from these packing cases.

H-2.4 In order to ensure the randomness, random number tables (*see* IS : 4905-1968*) shall be used. In case such tables are not available, the following procedure may be adopted.

H-2.4.1 Arrange all the cans in a systematic manner and starting from any can, every rth can shall be withdrawn, r being the integral part of $\frac{N}{n}$ where N is the total number of cans in the lot, and n is the number of cans to be selected.

---

*Methods for random sampling.

TABLE 4 OPENING OF PACKING CASES

(*Clause* H-2.3)

Number of Packing Cases in the Lot *N*	Number of Packing Cases to be Opened *n*
(1)	(2)
Up to 10	2
11 to 25	4
26 „ 64	5
65 „ 100	6
101 „ 150	7
151 „ 225	8
226 „ 300	9
301 „ 500	10

H-3. NUMBER OF TESTS

H-3.1 A representative sample drawn from the cans, selected for physical and chemical requirements, shall be tested for vacuum, head space, sodium chloride, nitrate, nitrite, heavy metals and total fat (*see* **2.8.5**, **2.8.6** and **2.8.7**).

H-3.2 Two samples as represented by the two cans selected, shall be tested for free fat [*see* Table 1, Item (v)].

H-3.3 Tests for Microbiological Requirements

H-3.3.1 *Incubation at* 37°C — 50 percent of the cans selected as in **H-2.2** shall be incubated at 37°C for not less than 14 days and subjected to microbiological examination (*see* Appendix G).

H-3.3.2 *Incubation at* 55°C — The remaining 50 percent of the cans shall be incubated at 55°C for not less than 14 days and subjected to microbiological examination (*see* Appendix G).

H-4. CRITERION FOR CONFORMITY

H-4.1 A lot shall be considered as conforming to the requirements of this standard if all the samples tested satisfy the corresponding requirements for the characteristics.

(*Continued from page* 2)

Members	*Representing*
SHRI D. S. CHADHA	Central Committee for Food Standards (Ministry of Health & Family Planning)
DR A. K. CHATTERJEE	Ministry of Agriculture (Department of Agriculture)
SHRI S. KRISHNAMURTHY (*Alternate*)	
SHRI S. K. DUTT	Accelerated Freeze Drying Factory (Ministry of Defence), Tundla
SHRI S. RAMASWAMI (*Alternate*)	
SHRI ANAND K. GOYLE	Essex Farms Private Limited, New Delhi
SHRI ARUN K. GOYLE (*Alternate*)	
DR T. S. GULRAJANI	Indian Veterinary Research Institute (ICAR), Izatnagar
SHRI S. S. VERMA (*Alternate*)	
SHRI N. K. MURALIDHARA RAO	Directorate of Marketing and Inspection (Ministry of Agriculture), Faridabad
SHRI S. JAYARAMAN (*Alternate*)	
COL M. C. SANYAL	Quartermaster General's Branch, Army Headquarters
LT-COL O. P. KAPUR (*Alternate*)	
VETERINARY OFFICER	Corporation of Madras
SHRI R. P. VIG	Government of Punjab

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 331 01 31
331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :

		Telephone
Central	: Manak Bhavan, 9, Bahadur Shah Zafar Marg, NEW DELHI 110002	331 01 31 331 13 75
* Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054	37 86 62
Northern	: SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43
Southern	: C.I.T. Campus, IV Cross Road, MADRAS 600113	41 29 16
† Western	: Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95

Branch Offices :

' shpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48
‡ Peenya Industrial Area, 1st Stage, Bangalore-Tumkur Road BANGALORE 560058	39 49 55
Gangotri Complex, 5th Floor, Bhadbhada Road, T.T. Nagar, BHOPAL 462003	55 40 21
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
Kalai Kathir Building, 6/48-A Avanasi Road, COIMBATORE 641037	2 67 05
Quality Marking Centre, N.H. IV, N.I.T., FARIDABAD 121001	—
Savitri Complex, 116 G.T. Road, GHAZIABAD 201001	8-71 19 96
53/5 Ward No. 29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003	3 31 77
5-8-56C L. N. Gupta Marg, (Nampally Station Road) HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71
117/418 B Sarvodaya Nagar, KANPUR 208005	21 68 76
Plot No. A-9, House No. 561/63, Sindhu Nagar, Kanpur Road, LUCKNOW 226005	5 55 07
Patliputra Industrial Estate, PATNA 800013	6 23 05
District Industries Centre Complex, Bagh-e-Ali Maidan, SRINAGAR 190011	—
T. C. No. 14/1421, University P. O., Palayam, THIRUVANANTHAPURAM 695034	6 21 04

Inspection Offices (With Sale Point) :

Pushpanjali, First Floor, 205-A West High Court Road, Shankar Nagar Square, NAGPUR 440010	52 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

---

*Sales Office Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, CALCUTTA	27 68 00
† Sales Office is at Novelty Chambers, Grant Road, BOMBAY	89 65 28
‡ Sales Office is at Unity Building, Narasimharaja Square, BANGALORE	22 39 71

Printed at Dee Kay Printers, New Delhi, India

AMENDMENT NO. 1 JANUARY 1976

TO

IS:1743-1973 SPECIFICATION FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(First Revision)

Corrigendum

(Page 8, Table 2, Caption) - Substitute the following for the existing caption:

'TABLE 2 METALLIC AND MICROBIOLOGICAL LIMITS FOR MUTTON & GOAT MEAT CANNED IN BRINE'

(AFDC 18)

AMENDMENT NO. 2 JULY 1989
TO
IS : 1743 - 1973 SPECIFICATION FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(*First Revision*)

(*Page* 3, *Foreword*) — Insert the following and renumber **0.4** as **0.5** :

'**0.4** In the preparation of this standard due consideration has been given to the provisions of the *Prevention of Food Adulteration Act,* 1954 and the rules framed thereunder, as well as the *Meat Food Products Order*, 1973. However, this standard is subject to the restrictions imposed under these, wherever applicable.'

(*Page* 6, *clause* **2.8.5**, *line* 2) — Substitute '150' *for* '250'.

[*Page* 7, *clause* **3.2.2**(k)] — Substitute the following for the existing matter:

'Licence No. and category given by the Licensing Authority.'

(*Page* 7, *clause* **3.2.2**) — Insert the following at the end:

'm) Ingredients used in the descending order.'

(AFDC 18)

AMENDMENT NO. 4 APRIL 2011
TO
IS 1743 : 1973 SPECIFICATION FOR MUTTON AND GOAT MEAT CANNED IN BRINE

(First Revision)

[*Page* 6, *clause* **3.2.2**(c)] — Substitute 'Net quantity of the contents of the can;' *for* 'Net mass of the contents of the can;'.

[*Page* 6, *clause* **3.2.2**(d)] — Substitute 'Drained quantity of the contents of the can;' *for* 'Drained mass of the contents of the can;'.

[*Page* 7, *clause* **3.2.2**(m)] — Insert the following at the end:

'n) Any other marking required under the *Standards of Weights and Measures (Packaged Commodities) Rules*, 1977, and the *Prevention of Food Adulteration Act*, 1954 and the Rules framed thereunder.'

(FAD 18)

Reprography Unit, BIS, New Delhi, India